

Response Under 37 C.F.R. 1.111  
U.S. Application No. 09/845,856

### **REMARKS**

Claims 1, 2 and 6-10 are pending in this application.

The present invention relates to a method for alkylating aromatics such as benzene with alkylating agents such as ethylene and propylene under alkylating conditions in the presence of an alkylation catalyst comprising phosphorus and a porous crystalline inorganic oxide material such as MCM-22, PSH-3, SSZ-25, MCM-36, MCM-49 and MCM-56.

Claim 1 has been amended to require the alkylating agent have at least 2 carbon atoms. Support for this limitation may be found in the specification at page 5, lines 1 to 9. Moreover, a limitation on catalyst phosphorus content taken from the lower phosphorus content of the range in claim 3 and the higher phosphorus content of the range in claim 5 has been added to claim 1. Claims 3, 4 and 5 are now canceled as redundant or inapposite to the amended claim. Moreover, claim 1 has been amended to specify that the contacting is carried out under conditions sufficient to produce the alkylaromatic compound. Support for this limitation can be found in the specification at page 8, lines 24 to 28.

### **REJECTIONS UNDER 35 USC 112, Second Paragraph**

The Examiner has rejected claims 1-10 under 35 USC 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner contends it is unclear what the result is of the contacting step.

This rejection is respectfully traversed.

By the present amendment, claim 1 has been amended to better define the invention to recite that the contacting is carried out under conditions sufficient to produce the alkylaromatic compound. Support for this limitation can be found in the specification at page 8, lines 24 to 28. Given the amended claim language, it is respectfully submitted that claims 1 to 10 now meet the requirements of 35 USC 112, second paragraph. Accordingly, withdrawal of this rejection is respectfully requested.

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### **REJECTIONS UNDER 35 USC 102(b)**

The Examiner has rejected claims 1-5 and 7 under 35 USC 102(b) as being anticipated by U.S. Patent No. 5,939,597 to Dessau. The Examiner contends that Dessau discloses a process of methylation of toluene in the presence of a catalyst containing MCM-22 and phosphorus.

This rejection is respectfully traversed.

By the present amendment, claim 1 has been amended to better define the invention and to recite an alkylating agent which includes an aliphatic group having at least 2 carbon atoms. Inasmuch as Dessau relates only to use of alkylating agents comprising methyl groups, the reference fails to disclose or suggest the invention as presently claimed. Accordingly, withdrawal of this rejection is respectfully requested.

The Examiner has also rejected claims 1, 2, 7, 8 and 10 under 35 USC 102(b) as being anticipated by U.S. Patent No. 5,536,894 to Degnan. The Examiner contends that Degnan discloses a process of alkylation of an aromatic such as benzene with ethylene or propylene in the presence of a catalyst containing MCM-56 and phosphorus.

This rejection is respectfully traversed.

By the present amendment, claim 1 has been amended to better define the invention to recite an alkylating agent which includes an aliphatic group having at least 2 carbon atoms in the presence of an alkylation catalyst comprising between about contains 0.05 and about 0.5 wt.% P. The importance of limiting the amount of phosphorus on the catalyst has been shown by applicants in the Examples. Table 3 at page 15 of the application provides the kinetic rate constants and cumene selectivity (DiPB/Cumene (wt.)) for Examples 5 through 9. The Table shows significantly higher kinetic rate constants and cumene selectivity are achieved for 0.1% to 0.5% alkylation catalysts among the tested catalysts containing 0%, 0.1%, 0.5%, 1.0%, and 2.0% phosphorus. Given that Degnan fails to provide any guidance whatsoever concerning the amount of phosphorus in the alkylation catalyst, the reference fails to disclose or suggest in any way the invention

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as presently claimed. Accordingly, withdrawal of the rejection under 35 USC 102(b) relying on U.S. Patent No. 5,536,894 to Degnan is respectfully requested.

**REJECTIONS UNDER 35 USC 103(a)**

The Examiner has rejected claims 3-5 and 9 under 35 USC 103(a) as being unpatentable over U.S. Patent No. 5,536,894 to Degnan along the lines discussed above. The Examiner further observes that while Degnan is silent respecting specific phosphorus content (claims 3-5) and MCM-22 (claim 9), "the content of phosphorus is only the matter of selection" while Degnan discloses that MCM-22 has similar characteristics with MCM-56. The Examiner concludes at page 4, fourth paragraph of the Office Action, it would have been obvious to one skilled in the art to modify Degnan's process "by selecting an appropriate amount of phosphorus *since it is expected that the Degnan catalyst containing any amount of phosphorus would yield similar results*" (emphasis added). As noted above, the amount of phosphorus in the catalyst has been shown in Table 3 of the specification to affect the kinetic rate constant as well as cumene selectivity for the alkylation process of the present invention. Thus, the "similar results" on which the Examiner relies do not exist for the presently claimed process. Similarly, even if it were assumed one skilled in the art might have substituted MCM-22 for Degnan's MCM-56 in the process of Degnan, the specific phosphorus content required by the present invention would not have been discernible to one skilled in the art familiar with Degnan's teachings. In view of this, it is respectfully urged that Degnan fails to disclose or suggest the present invention. Accordingly, withdrawal of this rejection under 35 USC 103 is respectfully requested.

The Examiner has also rejected claim 6 under 35 USC 103(a) as being unpatentable over U.S. Patent No. 5,536,894 to Degnan along the lines discussed above. The Examiner observes that while Degnan is silent respecting the phase of alkylation employed, U.S. Patent No. 5,557,024 to Cheng discloses alkylation using an MCM-56 catalyst either in the gas or liquid phase. The Examiner argues it would have been obvious to one skilled in the art to have modified Degnan's process by operating a liquid phase alkylation to arrive at

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applicants' process because it is expected that alkylation processes operated in the liquid or gas phase yield similar results.

This rejection is respectfully traversed.

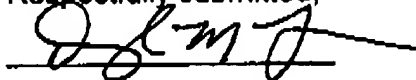
By the present amendment, the process of the present invention as claimed recites the use of alkylation catalyst having specific phosphorus content of 0.05 wt.% to 0.5 wt.%. The combination of Degnan and Cheng fails to disclose or suggest to one skilled in the art the present invention which, as noted above, provides enhanced activity and cumene selectivity as shown in Table 3 of the specification at page 15. Given this discovery, applicants respectfully submit that the present claim 6 is patentable over the combined references. Accordingly, withdrawal of this rejection is respectfully requested.

#### CONCLUSION

In view of the foregoing amendments and remarks, it is respectfully submitted that the claims as presently amended describe a method that meets the requirements of patentability. Allowance of the present claims is therefore earnestly solicited.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE IN THE CLAIMS:**

The following changes are being made to claim 1.

1. (Amended) A process for producing an alkylaromatic compound comprising the step of contacting an alkylatable aromatic compound with an alkylating agent which includes an aliphatic group having at least about 2 carbon atoms, under alkylation conditions in the presence of an alkylation catalyst comprising between about 0.05 and about 0.5 wt.% phosphorus and a porous crystalline inorganic oxide material having an X-ray diffraction pattern including the d-spacing maxima at  $12.4 \pm 0.25$ ,  $6.9 \pm 0.15$ ,  $3.57 \pm 0.07$  and  $3.42 \pm 0.07$  Angstrom, said conditions being sufficient to produce said alkylaromatic compound.